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PHOTOGRAPHS AND DESCRIPTIONS OF CUP-FUNGI—V. PEZIZA PROTEANA AND PEZIZA VIOLACEA

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(WITH PLATE 1, CONTAINING 2 FIGURES)

During the summer of 1915, several collections were made of a *Peziza* which agrees with Boudier's description and illustration of *Aleuria proteana*. The species occurs on old burnt places which have been thoroughly overrun with mosses. The apothecia when young are beautiful waxy-white but with age become slightly colored, smoky or with a tinge of pink, which occasionally runs over to lilac.

The habitat, size, and character of the spores would indicate a close relationship with *Peziza violacea*, a species which is comparatively common on charcoal beds and recently burned places. The latter species, however, has a deep-violet hymenium which in aged specimens is almost black, the contrast in color being so marked that the plants could scarcely be referred to the same species, although their similarity in other respects cannot escape notice. The following descriptions and photographs have been drawn from fresh material collected in the outskirts of New York City.

Peziza proteana (Boud.) Seaver

Aleuria proteana Boud. Bull. Soc. Myc. Fr. **15**: 50. 1899.
Galactinia proteana Sacc. Syll. Fung. **16**: 709. 1902.

Apothecia sessile, cup-shaped, finally more or less repand, en-

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tirely white when young, becoming overcast with a faintly reddish or lilac tint, reaching a diameter of 3–6 cm.; hymenium concave, becoming plane or convex and usually umbilicate, color varying from white when young to rosy, pale-violet, or slightly brownish; asci cylindric or subcylindric, reaching a length of 225–250 μ and a diameter of 10 μ; spores 1-seriate or slightly crowded, small, ellipsoid, usually containing two small oil-drops, smooth, becoming sculptured, 5–7 $\times$ 12–13 μ; spore-sculpturing assuming the form of minute warts or papillae; paraphyses slender, septate, enlarged above, where they reach a diameter of 7–8 μ.

On old burnt places which have been overrun with mosses.

TYPE LOCALITY: France.

DISTRIBUTION: New York and Texas; also in Europe.

ILLUSTRATION: Bull. Soc. Myc. Fr. **15**: *pl. 3, f. 1*; Boud. Ic. Myc. *pl. 293*.

Peziza violacea Pers. Syn. Fung. 639. 1801

Peziza Boltoni Quél. Bull. Soc. Bot. Fr. **25**: 290. 1878.
Aleuria violacea Gill. Champ. Fr. Discom. 47. 1879.
Peziza ampelina Quél. Grevillea **8**: 116. 1880.
Humaria violacea Sacc. Syll. Fung. **8**: 149. 1889.
Aleuria Boltoni Gill. Champ. Fr. Discom. 206. 1886.

Apothecia gregarious, sessile or substipitate when young, at first closed and subglobose, gradually expanding, becoming shallow cup-shaped, discoid, or occasionally repand, at first regular in form, becoming irregular, the margin often splitting, externally at first white, finally becoming pale-violaceous, reaching a diameter of 3 or 4 cm., although often much smaller; hymenium concave, plane, or convex, pale-violet when young, becoming deep-violet with age, finally almost black, even or slightly uneven and usually umbilicate; substance very soft and brittle; asci cylindric or subcylindric, gradually attenuated below, reaching a length of 200–250 μ and a diameter of 12–15 μ, 8-spored; spores 1-seriate, or irregularly disposed, ellipsoid, usually containing two small oil-drops, hyaline, becoming sculptured, 8 $\times$ 12–13 μ; spore-sculpturing consisting of very minute warts; paraphyses slender, septate, enlarged above, usually curved and filled with violet granules, reaching a diameter of 8 μ at their apices.

On burnt places and on charcoal beds.

TYPE LOCALITY: Europe.

DISTRIBUTION: New York to Wisconsin; also in Europe.

ILLUSTRATION: Grevillea 8: pl. *131, f. 4*; Bolton, Gesichte 3: *pl. 99, f. a*; Boud. Ic. Myc. *pl. 276*.

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FUNGI AND LICHENS FROM THE ISLAND OF GUAM

PAUL WEIDEMEYER GRAFF

With the opening up of the Pacific to trade and travel, the natural sequence of events brings about a more universal interest, both general and scientific, regarding the region. From a botanical standpoint our knowledge is as yet extremely limited. A few isolated localities have been worked over to some extent, but even in these places much remains to be accomplished. In the Marianne Islands, of which Guam is the largest, only a few botanical collections of any extent have been made.

These islands are located, approximately, between 13° to 20° north latitude and 143° to 146° east longitude. The island of Guam itself is about 46 kilometers long and 16 wide at its broadest part; this, however, is not in a central location as the island is more or less dumb-bell shaped and only about 5 kilometers broad in the region of Agaña, the chief town. From San Francisco by way of Honolulu, as the boats ordinarily travel, the islands are about 8,670 kilometers distant and are about 2,440 kilometers east from Manila. As is true of a large percentage of the Pacific islands, the Marianne Islands are of volcanic origin.

The island of Guam was discovered by Ferdinand Magellan, during his voyage of circumnavigation, on March 6, 1521, a short time before his fatal visit to the Philippines. The first botanical collection was not made until 1792, when Thaddeus Haenke and Luis Née of the Malaspina Expedition, with which they were connected as botanists, visited the islands. They spent between February 12th and 24th at Guam but there is no record of any fungi having been preserved by them from that place. In fact, but three fungi have been reported as being collected by them on the entire voyage. Two of these were gathered in Mexico and the other in the Philippine Islands. With this list might also be mentioned the fact that nineteen lichens from the American continent, mostly from Peru and Chili, make up the entire

list of fungi collected by these two botanists. The next collection of Guam plants was made by Adelbert de Chamisso de Boncourt, botanist of the Romanzoff Expedition, which visited the place in November, 1817. His collection, though containing numerous flowering plants and ferns, contained no fungi from these islands. It seems strange that while the Philippines, Hawaii, Chili, Brazil, and a number of other places are represented by specimens in his fungous collection, Guam should have been slighted in this respect. It may have been that the stay of the Expedition here was very short or material of this class of plants may have been neglected while here.

The first expedition on which any specimens of fungi were gathered and preserved was that under the command of Louis Freycinet, which visited Guam in March, 1819, a little more than a year after Chamisso. The expedition had been joined by Charles Gaudichaud-Beaupré as physician and botanist and it was through his efforts that an extensive botanical collection was made. Several months were spent in the exploration of Guam and the neighboring islands of Rota and Tinian. The expedition made what was probably the largest single collection to date in the botanical exploration of Guam. Unfortunately, however, on the return voyage their vessel, the "Uranie" foundered while in the Falkland Islands. The hold in which the herbarium was stored became flooded and more than half the botanical collections were destroyed.

Among the remaining material there are sixty-seven species designated as fungous specimens, of which twenty-five are credited to the Marianne Islands and the larger portion of the remainder to the following localities: Rio de Janeiro, Isle of France, Rawak, and the Hawaiian Islands. The number classed as lichens is slightly larger, being ninety-seven in all, of which eighteen are from the Marianne Islands. The arrangement, classification, and description of new species in both the fungi and lichens was published by Persoon between 1826 and 1830 and a goodly percentage were described by him as new. Of this material all but thirteen are recognizable and will be found distributed in proper order in the list to follow. The uncertain species include the following and have been omitted: *Lycogala marianna, Sphaeria laguncula,*

Himantia nodulosa, Porinia tessellata, Ophegrapha cymbiformis, O. cincta, Ctesium album, C. rugosum, Gyrophora perforata, Collema ulvaceum, C. peltigera, C. stellare, and *Physica fastigiata.* It will be noted that a considerable number of species given by Persoon in his fungous list are now known to be lichens and will be found under lichen genera in the portion of this paper following.

Montagne, in 1843 and 1856, published among notes on other fungi a few scattered ones on some species collected by Gaudichaud, all of which are in the herbarium of the Paris Museum. A few lichens also received attention but among the several species mentioned nothing was reported new to the islands.

No further reference to Guam fungi can be found till 1901, when Schumann and Lauterbach published their "Flora der Deutschen Schutzgebiet in der Sudsee." They include an enumeration of six fungi and three lichens. This enumeration does not seem to designate plants collected during this voyage but rather to have been taken, for the most part, from Gaudichaud's publication. The Marianne Islands are not mentioned in their itinerary and were probably not visited. The fungi listed by them include *Auricularia auricula-judae* (L.) Schrot., for which they consider Persoon's Guam type *A. ampla* a synonym and suggest that probably his *A. ornata* should receive a similar classification. Under *Fomes scabrosus* (Pers.) Fr., they include Persoon's two Guam species, *Polyporus scabrosus* and *P. fuscobadius. Polyporus mariannus* Pers. is considered by them as *P. kamphoveneri* Fr., and is so listed. *Polyporus sanguineus* L., *P. saccatus* Pers., and *Agaricus alneus* L., as reported by Persoon, are given under the names *Polystictus sanguineus* (L.) Mey., *P. xanthopus Fr.,* and *Schizophyllum alneum* (L.) Schroet., respectively. Among the lichens *Dictyonema membranaceum* Agardh., *Coenogonium linkii* Ehrenb., and *Ramalina subfraxinea* Nyl., are enumerated from this locality.

In 1905 Safford published in his "Useful Plants of Guam" a short list of six species of fungi which is identical with that of Schumann and Lauterbach, exclusive of their lichens, and is very evidently based on their list rather than any collection of his own or even on Gaudichaud's record. This is the last published list

with the exception of one by the present writer, included in Merrill's "Enumeration of the Plants of Guam," in 1914.

In this last named article the writer, with an unfortunate lack of literature, attempted a list of the then known species from the island. Gaudichaud's publication was inaccessible, hence only his species as included by Schumann and Lauterbach and Safford could be included and *Fomes lignosus* was erroneously given in the list. To these were added several recent collections which are preserved in the herbarium of the Bureau of Science, Manila. In all, this enumeration included eighteen species of fungi, one of which, *Cladosporium clemensiae,* was described as new. While this article was short and imperfect with the exclusion of lichens, it more than doubled the known species of fungi from Guam.

The present enumeration is warrented by the inclusion of all known species of fungi and lichens from the island, with the exception of several doubtful species which are listed at the end, and the hope that it may form a basis for future work on the fungus flora of this locality. This enumeration includes Gaudichaud's species which are deposited in the herbarium of the Paris Museum, material collected by Mrs. Mary S. Clemens in 1911 and R. C. McGregor during the same year, and specimens communicated by the Guam Experiment Station. These last are all preserved in the herbarium of the Bureau of Science in Manila where they were examined and identified.

FUNGI

PHYLLACHORA Nitschke

PHYLLACHORA AFZELIAE Syd. Philip. Journ. Sci. Bot. 8: 277. 1913

Guam Experiment Station 324, on leaves of *Intsia bijuga* (Colbr.) O. Kuntze (*Afzelia bijuga* A. Gray).

Described from the Philippine material collected on the same host. As yet only reported from the Philippines and Guam.

AURICULARIA Bull.

AURICULARIA ORNATA Pers. in Gaud. Bot. Freyc. Voy. Uranie 177. *pl. 2, fig. 4.* 1826

Helvella mesenterica Dicks. Plant. Crypt. 1: 20. 1785.

Auricularia tremelloides Bull. Hist. Champ. Fr. 278. *pl.* 290. 1791–98.
Auricularia violacea Bull. in l. c.
Thelephora mesenterica Pers. Syn. Fung. 571. 1808.
Thelephora purpurea Pers. in l. c.
Auricularia corrugata Sowerb. Engl. Fungi 290. 1797–1815.
Phlebia mesenterica Fr. Elench. Fung. **1**: 154. 1828.
Oncomyces mesentericus Klotz. Linnaea **7**: 195. 1832.
Auricularia mesenterica Fr. Epicr. Myc. 555. 1838.
Auricularia pusio Berk. Journ. Linn. Soc. Bot. **17**: 386. 1879.

Mary S. Clemens s. n., in the vicinity of Agaña, November 27, 1911, on dead tree branches. Gaudichaud, in the herbarium of the Paris Museum.

Auricularia ornata Pers. is considered by Schumann and Lauterbach in their enumeration of Guam fungi as a synonym of *Auricularia auricula-judae* (L.) Schroet., together with *Auricularia ampla* Pers., also described from Guam material. Their opinion will, however, hardly be accepted.

A fungus of very general tropical and subtropical distribution, in both eastern and western hemispheres.

HIRNEOLA Fries

HIRNEOLA AMPLA (Pers.) Fr. Fungi Nat. 26. 1848

Auricularia ampla Pers. in Gaud. Bot. Freyc. Voy. Uranie 177. 1826.
Exidia nobilis Lév. Ann. Sci. Nat. III. Bot. **2**: 218. 1844.
Exidia ampla Lév. Ann. Sci. Nat. III. Bot. **5**: 159. 1846.
Hirneola nobilis Fr. Fungi Nat. 26. 1848.

Gaudichaud, in herb. Paris Mus.

This fungus has been collected in India, the Moluccas, Philippines, Japan, and in Guiana. It, in all probability, will prove of very general tropical distribution when better known.

HIRNEOLA AURICULA-JUDAE (Fr.) Berk. Outl. Brit. Fung. 289. 1860. Fr. Hym. Eur. 695. 1874

Exidia auricula-judae Fr. Syst. Myc. **2**: 221. 1823.
Tremella auricula L. Sp. Pl. **2**: 1157. 1753.

Tremella sessilis Thunb. Flor. Japon. 345. 1784.
Peziza auricula L. Syst. Veg. Ed. XV. 1018. 1789.
Tremella auriformis Hoffm. Veg. Crypt. 31. *pl. 6, fig. 4.* 1790.
Auricularia sambucina Mart. Flor. Crypt. Erlang. 459. 1817.
Auricularia auricula Underw. Mem. Torr. Bot. Club **12**: 15. 1902.
1911. R. C. McGregor 588, October, 1911. Guam Experiment Station 304.

A very common species in all warm countries of the tropics and neighboring regions.

Hirneola nigricans (Hook.) comb. nov.

Peziza nigricans Hook. in Knuth Syn. Plant. **1**: 13. 1822.
Exidia hispidula Berk. Ann. Mag. Nat. Hist. I, **3**: 396. 1839.
Hirneola hispidula Sacc. Syll. Fung. **6**: 769. 1888.

Guam Exp. Sta. 424, Thompson, May, 1912.

Previously collected in the northern portion of South America, also in Mauritius, Australia and Ceylon.

POLYPORUS Micheli

POLYPORUS MARIANNUS Pers. in Gaud. Bot. Freyc. Voy. Uranie 173. 1826

Polyporus anebus Berk. Hook. Lond. Journ. Bot. **6**: 504. 1847. Gaudichaud, in herb. Paris Mus.

Schumann and Lauterbach cite *Polyporus mariannus* Pers. as a synonym of *P. kamphoveneri* Fr. With this Murrill does not agree (Bull. Torr. Bot. Club **34**: 468. 1907), but considers the species identical with *P. corrugatus* Pers. It seems probable, however, that it is the same species Berkeley described from Ceylon as *P. anebus*. In this opinion Lloyd (Synopsis Apus Polyporus 382. 1915), who has critically studied much of the basidiomycetous material in the Paris Museum, concurs. As Persoon's name was given the fungus some twenty years prior to Berkeley's, its use should be accepted.

First described from the Marianne Islands. Also collected in Africa, Ceylon, Japan and the islands of the Pacific.

FOMES Fries

Fomes lineatus (Pers.) comb. nov.

Polyporus lineatus Pers. in Gaud. Bot. Freyc. Voy. Uranie 174. 1826.

Polyporus fastuosus Lév. in Gaud. Bot. Voy. Bonite 1: 180. 1846.

Fomes fastuosus Cooke, Grevillea 14: 18. 1886.

Gaudichaud, in herb. Paris Mus.

This species was omitted from the lists of both Schumann and Lauterbach, and Safford. As is true of a number of tropical forms, this species may only develop a single hymenial layer but often develops a greater number and hence becomes a Fomes. The possibility of an entire collection from a locality being of one type while another might show the further development of a Fomes has been one of the causes of multiplicity of names in the synonymy of many tropical species. *Pyropolyporus fastuosus* Murr., as first published (Murrill in Bull. Torr. Bot. Club 34: 179. 1907) for Philippine material, was applied to *Fomes spadiceus* (Berk.) Cooke instead of *F. fastuosus* (Lév.) Cooke, as is shown by the duplicate material in the herbarium of the Bureau of Science, Manila, where both species of the fungus are common.

Collected in the Malay States, Moluccas, Philippines and the Marianne Islands.

FOMES NUBILUS Fr. Epicr. Myc. 491. 1838, var. *albo-limbatus* Kalchbr. Grevillea 10: 55. 1881

McGregor 589, October, 1911. Guam Exp. Sta. 266.

Previously known only as an African species which had been collected in the Congo and Guinea.

POLYSTICTUS Fries

POLYSTICTUS AFFINIS (Nees) Fr. Nov. Act. Reg. Soc. Sci. Ups. III. 1: 75. 1855

Polyporus affinis Nees, Nov. Act. Acad. Nat. Cur. 13[1]: 18. *pl. 4, fig. 1.* 1826.

McGregor 590, October, 1911.

A species intermediate between *Polystictus xanthopus* Fr. and *P. flabelliformis* Kl., and very closely related to *P. luteus* Bl. and Nees, from which it is separated by its smaller size and more delicate character.

Of very general distribution throughout the tropics and one of the most common species to be found in this region.

POLYSTICTUS OCCIDENTALIS (Kl.) Fr. Nov. Symb. Myc. 90. 1851

Polyporus occidentalis Kl. Linnaea 8: 486. 1833.
Trametes lanatus Fr. Epicr. Myc. 490. 1838.
Trametes occidentalis Fr. Epicr. Myc. 491. 1838.
Trametes wahlbergii Fr. Fungi Natal. 11. 1848.
Trametes scalaris Fr. Fungi Natal. 12. 1848.
Polyporus scorteus Fr. Nov. Symb. Myc. 89. 1851.
Trametes devexa Berk. Journ. Linn. Soc. 13: 165. 1873.
Polyporus illotus Kalchbr. Grevillea 10: 102. 1882.
Coriolopsis occidentalis Murr. Bull. Torr. Bot. Club 32: 358. 1905.

Guam Exp. Sta. 303.

This much described species is of very general distribution throughout the tropics.

POLYSTICTUS SANGUINEUS (L.) Fr. Nov. Symb. Myc. 75. 1851

Boletus sanguineus L. Spec. Plant. Ed. II, 1646. 1763.
Xylometron sanguineum Paul. Icon. Champ. *pl. 3, figs. 3, 4.* 1793.
Agaricus ruber Lamk. Encyc. Met. Bot. 1: 50. 1783.
Polystictus sanguineus Mey. Flor. Esseq. 304. 1818.
Polyporus sanguineus Pers. in Gaud. Bot. Freyc. Voy. Uranie 170. 1826.
Polyporus flaccidus Pers. in Gaud. Bot. Freyc. Voy. Uranie 171. 1826.
Polyporus ampliporus Fr. Elench. Fung. 1: 99. 1828.
Pycnoporus sanguineus Murr. Bull. Torr. Bot. Club 31: 421. 1904.

Guam Exp. Sta. 300.

The distribution of this fungus is universal throughout the

tropics and it is a form of the temperate species *Polystictus cinnabarinus* (Jacq.) Fr. It makes no discrimination as to the kind of wood upon which it will grow, being omnivorous in that respect.

POLYSTICTUS XANTHOPUS Fr. Nov. Symb. Myc. 74. 1851

Polyporus xanthopus Fr. Obs. Myc. **2**: 255. 1815–18. Syst. Myc. **1**: 505. 1821.

Boletus katui Ehrenb. in Nees, Hor. Phys. Ber. 93. *pl. 19, fig. 12.* 1820.

Polystictus saccatus Pers. in Gaud. Bot. Freyc. Voy. Uranie 169. *pl. 1, fig. 3.* 1826.

Polystictus cupro-nitens Kalchbr. Thüm. Myc. Univ. n. 1702.

Polystictus crassipes Curr. Flor. Pug. 122.

Gaudichaud, in herb. Paris Mus.

Of general tropical distribution and particularly common through the Indian and Polynesian regions. Closely related to *Polystictus affinis* Nees and *P. perula* (Beauv.) Fr., though having the stipe central rather than lateral, and with several other related species of the "Polystictus perula Group" very common on all sorts of host material in the Malayan islands.

POLYSTICTUS XANTHOPUS Fr. var. florideus (Berk.) Bres. Hedwigia **53**: 61. 1912

Polyporus florideus Berk. Hook. Journ. Bot. and Kew Gard. Misc. **6**: 137. 1854.

Polystictus mukuensis Cooke, Grevillea **16**: 25. 1887.

Polystictus luteus (Bl. & Nees) Fr., var. *bukobensis* P. Henn. Engl. Bot. Jahrb. **17**: 27. 1893.

Guam Exp. Sta. 194.

The specimens of this collection have all the characters of the variety, including the slightly larger size of the pores which average 66 by 116 μ, except the color of the top of the pileus. This is pallid and of a light golden brown color. One collection of a fungus identical with this has been made in the Philippine Islands and has also been placed, at least for the present, as belonging to this variety. It is questionable if these are not as worthy of a

varietal name as those already known as var. *florideus* or, at least, of being distinguished from them as forma *pallidus*. Both the Philippine and Guam collections show uniformity and as yet no gradations between these different cases have been found.

So far as known this pale form has only been collected in the Philippine Islands and Guam. The usual form is rather common in the Malayan region and the Asiatic tropics but not found with near the frequency of the species.

TRAMETES Fries

TRAMETES CORRUGATUS (Pers.) Bres. Hedwigia **51**: 316. 1912

Polyporus corrugatus Pers. in Gaud. Bot. Freyc. Voy. Uranie 172. 1826.
Polyporus fusco-badius Pers. in l. c.
Polyporus scabrosus Pers. in l. c.
Daedalea sanguinea Klotz. Linnaea **8**: 481. 1833.
Polyporus indecorus Jungh. Flor. Crypt. Java 51. 1838.
Polyporus tegularis Lév. Ann. Sci. Nat. III. Bot. **5**: 131. 1846.
Hexagonia cruenta Mont. Syll. Gen. Spec. Crypt. 169. 1856.
Polystictus persoonii Cooke, Grevillea **14**: 85. 1885.
Trametes nitida Pat. Journ. Bot. **4**: 17. 1890.
Earliella cubensis Murr. Bull. Torr. Bot. Club **32**: 479. 1905.
Earliella corrugata Murr. Bull. Torr. Bot. Club **34**: 468. 1907.

Guam Exp. Sta. 301. Gaudichaud, in herb. Paris Mus.

A much described species of universal tropical distribution. Reported notably from West Africa, India, Ceylon, Java, Borneo, Sumatra, the Philippines, Guam, Australia and the American tropics. The species was first described from material collected in Guam by Gaudichaud-Beaupré.

HEXAGONIA Fries

HEXAGONIA BIVALVIS (Pers.) Bres. Hedwigia **51**: 318. 1912.
var. puchella (Lév.) Bres. Hedwigia **53**: 73. 1912
Hexagonia pulchella Lév. Ann. Sci. Nat. III. Bot. **2**: 200. 1844.

Guam. Exp. Sta. 423.

First described from material collected in Java. Since reported from Malacca, Mauritius and the Philippines. The va-

riety proves to be of much more frequent occurrence than the species.

LASCHIA Fries

LASCHIA PHILIPPINENSIS Graff, Philip. Journ. Sci. Bot. **8**: 300. 1913.

Agaña, Clemens, November 27, 1911, on dead twigs.

The type of this species was also collected by Mrs. Clemens, but on Mount Maquiling, Luzon, in the Philippine Islands. A comparison of this material with the type leaves no question of their identity.

So far as known this species has only been collected in the Philippines and Guam.

SCHIZOPHYLLUM Fries

SCHIZOPHYLLUM COMMUNE Fr. Syst. Myc. **1**: 330. 1821

Agaricus radiatus Vaill. Bot. Paris 10. 1727.
Agaricus alneus Linn. Flor. Suec. n. 1242. 1745–55.
Agaricus multifidus Batsch, Elench. Fung. Contin. **1**: 124. *fig. 126.* 1786.
Scaphophorus agaricoides Ehrb. in Nees Horae Phys. Berol. 94. 1820.
Schizonia vulgaris Pers. Myc. Eur. **3**: 14. 1822–28.
Schizophyllum alneum Schroet. in Cohn Krypt. Flor. Schles. **3**: 383. 1887.

Guam. Exp. Sta. 302.

This is probably one of the most widely distributed of all basidiomycetous fungi. It is apparently found throughout all tropical and temperate regions.

LENTINUS Fries

LENTINUS VELUTINUS Fr. Linnaea **5**: 510. 1830

Agaricus strigopus Pers. in Gaud. Bot. Freyc. Voy. Uranie 167. *pl. 1, fig. 6.* 1826
Lentinus capronatus Fr. Epicr. Myc. 388. 1838.
Scleroma velutinum Fr. Epicr. Myc. 392. 1838.
Lentinus setiger Lév. Ann. Sci. Nat. III. Bot. **2**: 176. 1844.

Lentinus braccatus Lév. in Zoll. Syst. Verz. Ind. Arch. 17. 1854–55.

Guam Exp. Sta. 425.

Persoon's name is antedated by *Lentinus strigopus* (Schw.) Fr., reported by Schweinitz from Carolina, and hence is not valid.

Collected in tropical South America, the West Indies, United States and the Philippine Islands.

COPRINUS Persoon

COPRINUS HEMEROBIUS Fr. Epicr. Myc. 253. 1838

Agaricus campanulatus Bolt. Hist. Fung. 31. 1788–91.
Agaricus bubulinus Schum. Enum. Plant. Sael. 2: 352. 1801–03.

Guam Exp. Sta. 329.

This species is very evidently related to *Coprinus plicatilis* (Curt.) Fr., as found in the Philippine Islands. It has, however, a longer stipe and a glabrous cap. Mature spores of the Guam material average $8.7 \times 12.5\,\mu$ and show a tendency toward being apiculate.

Previously reported from various localities in Europe.

NAUCORIA Fries

NAUCORIA PUSIOLA Fr. Hym. Eur. 258. 1874

Agaricus pusiolus Fr. Syst. Myc. 1: 264. 1821.
Agaricus laevis Pers. Myc. Eur. 3: 164. *pl. 25, fig. 1.* 1822–28.

Guam Exp. Sta. 330.

Spores broadly elliptical in the Guam material, sometimes becoming irregularly elliptical, averaging $6 \times 7.8\,\mu$, light brown in color.

Previously collected in Europe and Australia.

PHOMA Fries

PHOMA LUSITANICA Thüm. Contr. Myc. Lusit. 335

Vicinity of Piti, McGregor 406a, October, 1911, on twigs of *Glossogyne tenuifolia* (Less.) Cass.

Spores $2 \times 4\,\mu$ in perithecia averaging $95\,\mu$ wide and $130\,\mu$ high, including the ostiole.

Previously collected in Lusitania by Moller.

CLADOSPORIUM Link

CLADOSPORIUM CLEMENSIAE Graff, Philip. Journ. Sci. Bot. 9: 40. 1914

Vicinity of Agaña, Clemens, November 27, 1911, on leaves of *Eragrostis tenella* (L.) R. & S.

Found in great quantities on the under surface of the leaves and occasionally on the upper in dark brown spots. The vegetative hyphae is light in color, septate and branches irregularly. Conidiophores erect, simple, fuscous, seldom more than three or four in a cluster. Color is given to the spots by the conidiophores and spores which are dark brown.

As yet only known from Guam.

CLADOSPORIUM FASCICULATUM Corda, Icon. Fung. Cog. 15. *pl. 4, fig. 216.* 1842

Vicinity of Piti, Guam Exp. Sta. 4a, Thompson, November, 1910, on *Dactyloctenium aegyptiacum* Willd.

Reported from both Europe and Asia.

LICHENES

PSEUDOPYRENULA Müll.

Pseudopyrenula tessella (Pers.) comb. nov.

Verrucaria tessella Pers. in Gaud. Bot. Freyc. Voy. Uranie 183. 1826–30.

Varrucaria ochroleuca Eschw. in Mart. Icon. Sel. *pl. 8, fig. 3, 4.* 1828.

Trypethelium ochroleucum Nyl. Flora 126. 1869.

Pseudopyrenula ochroleuca Wainio, Lich. Brésil 209. 1890.

Gaudichaud, in herb. Paris Mus.

Collected in tropical America, India, the Federated Malay States, and Guam.

PSEUDOPYRENULA TROPICA (Ach.) Müll. Arg. Lich. Beitr. 602. 1883

Verrucaria tropica Ach. Lich. Univ. 278. 1810.

Verrucaria gaudichaudii Fée, Essai Crypt. Ecore. 87. *pl. 22, fig. 4.* 1824.

Pyrenula gaudichaudii Pers. in Gaud. Bot. Freyc. Voy. Uranie 182. 1826–30.
Sagedia tropica Massal. Ric. Lich. Crost. 161. 1852.
Trypethelium tropicum Müll. Arg. Pyr. Cub. 393. 1885.

Gaudichaud, in herb. Paris Mus.

Reported from tropical Africa, Malaya, and tropical Asia.

BOTTARIA Massalongo

BOTTARIA VARIOLOSA (Pers.) Wainio, Lich. Brésil 197. 1890

Pyrenula variolosa Pers. in Gaud. Bot. Freyc. Voy. Uranie 181. 1826–30.
Verrucaria variolosa Mont. Syll. Crypt. 368. 1861.
Anthracothecium variolosum Müll. Linnaea **43**: 44. 1880.

Gaudichaud, in herb. Paris Mus.

Probably a well distributed species. Reported from Cuba, Brazil, Mexico, Guam, and tropical Africa.

ARTHONIA (Acharius) Zahlbr.

ARTHONIA VIOLACEA Pers. in Gaud. Bot. Freyc. Voy. Uranie 187. 1826–30

Gaudichaud, in herb. Paris Mus.

As yet only reported from localities in Polynesia.

GRAPHIS (Adanson) Müll.

GRAPHIS CONTEXTA (Pers.) Nyl. Bull. Soc. Linn. Norm. II. **2**: 81. 1868

Emblemia contexta Pers. in Gaud. Bot. Freyc. Voy. Uranie 184. 1826–30.
Emblemia venosa Mont. Ann. Sci. Nat. III. Bot. **10**: 129. 1848.

Gaudichaud, in herb. Paris Mus.

Collected in tropical Africa, southern Asia, and the islands of the Pacific.

GRAPHIS HETEROCARPA Nyl. Lich. Japon. 114. 1890

Opegrapha heterocarpa Fée, Essai Crypt. Exot. **1**: 29. 1824.
Graphis scripta Ach., var. *ochroleuca* Pers. in Gaud. Bot. Freyc. Voy. Uranie 183. 1826–30.

Gaudichaud, in herb. Paris Mus.

A species of very cosmopolitan distribution, both tropical and temperate.

GRAPHIS LABYRINTHICA Ach. Syn. Lich. 107. 1814

Stictis dispar Pers. in Gaud. Bot. Freyc. Voy. Uranie 178. 1826–30.

Sarcographa labyrinthiformis Belang. Voy. Ind. Orient. Crypt. 137. 1846.

Gaudichaud, in herb. Paris Mus.

Found in the American tropics, Malaya, and East Africa.

COENOGONIUM Ehrenb.

COENOGONIUM CONTROVERSUM Pers. in Gaud. Bot. Freyc. Voy. Uranie 214. 1826–30

Coenogonium linkii Ehrenb., var. *leprieurii* Mont. Ann. Sci. Nat. III. Bot. **16**: 47. 1851.

Coenogonium leprieurii Nyl. Ann. Sci. Nat. IV. Bot. **16**: 89. *fig. 15–19.* 1862.

Gaudichaud, in herb. Paris Mus.

Collected in tropical South America, New Caledonia, Mauritius and East Africa.

LECIDEA Acharius

LECIDEA FURFURACEA Pers. in Gaud. Bot. Freyc. Voy. Uranie 192. 1826–30

Lecidea sanguineo-atra Nyl., var. *furfuracea* Nyl. Enum. Lich. 121. 1857.

Collected in the American tropics and islands of the Pacific.

LEPTOGIUM (Acharius) S. Gray

LEPTOGIUM TREMELLOIDES (Linn.) Wainio, Lich. Brésil 209. 1890

Lichen tremelloides Linn. Syst. Veget. Suppl. 450. 1781.

Lichen azureus Sw. Flor. Ind. Occ. **3**: 1895. 1806.

Collema mariannum Pers. in Gaud. Bot. Freyc. Voy. Uranie 203. 1826–30.

Leptogium mariannum Mont. in Gay Hist. Fis. Polit. Chile **8**: 226. 1852.

Leptogium azureum Nyl. Lich. N. Zeland 10. 1888.

Gaudichaud, in herb. Paris Mus.

A plant of very broad tropical and semitropical distribution.

PANNARIA Delacroix

PANNARIA PANNOSA (Ach.) Nyl. Syn. Lich. **2**[1]: 29. 1863.

Parmelia pannosa Ach. Syn. Lich. 329. 1814.

Parmelia marianna Fr. Syst. Orb. Veg. 284. 1825.

Pannaria marianna Müll. Arg. Lich. Beitr. 1159. 1887.

Gaudichaud, in herb. Paris Mus.

Reported from Brazil, East Africa, Malacca, Java, and other Pacific islands.

COCCOCARPIA Pers.

COCCOCARPIA INCISA Pers. in Gaud. Bot. Freyc. Voy. Uranie 206. 1826–30.

Coccocarpia molybdaea Pers., var. *incisa* Nyl. Syn. Lich. **2**: 43. 1885.

Gaudichaud, in herb. Paris Mus.

Collected in tropical America, Java, Malacca, and the Adaman Islands.

COCCOCARPIA PELLITA (Ach.) Müll. Arg. Lich. Beitr. 421. 1882

Parmelia pellita Ach. Lich. Univ. 468. 1810.

Coccocarpia molybdaea Pers. in Gaud. Bot. Freyc. Voy. Uranie 206. 1826–30.

Pannaria molybdaea Tuck. Syn. N. Am. Lich. **1**: 124. 1882.

Gaudichaud, in herb. Paris Mus.

Collected in Brazil, Peru, Japan, Malacca, Java, and East Africa.

COCCOCARPIA PELLITA (Ach.) Müll., var. smaragdina (Pers.) Müll. Flora **1882**: 421. 1882

Coccocarpia smaragdina Pers. in Gaud. Bot. Freyc. Voy. Uranie 206. 1826–30.

Gaudichaud, in herb. Paris Mus.

An American and Asiatic species. Collected in Brazil, New Zealand, Java, and Malacca.

PERTUSARIA DC.

PERTUSARIA VELATA (Turn.) Nyl. in Hue, Rev. Bot. **5**: 118. 1886

Parmelia velata Turn. Trans. Linn. Soc. **9**: 143. *pl. 12, fig. 1.* 1808.

Lecanora pilulifera Pers. in Gaud. Bot. Freyc. Voy. Uranie 194. 1826–30.

Pertusaria pilulifera Nyl. Enum. Lich. 116. 1857.

Clausaria fallens Nyl. Ann. Sci. Nat. IV. Bot. **12**: 45. 1859.

Gaudichaud, in herb. Paris Mus.

First described by Turner from English material where he mentions that it is rarely found. Since collected in the tropics of America, Africa, Asia, and Oceania.

PARMELIA (Acharius) DeNot.

PARMELIA CAPERATA (Linn.) Ach. Meth. Lich. 216. 1803

Lichen caperatus Linn. Sp. Pl. 1147. 1753.

Gaudichaud, in herb. Paris Mus.

A species of very general distribution, both tropical and temperate localities forming its habitat.

RAMALINA Acharius

RAMALINA FARINACEA (Pers.) Nyl. Syn. Lich. 1^2: 294. 1860

Physcia farinacea Pers. in Gaud. Bot. Freyc. Voy. Uranie 208. 1826–30.

Gaudichaud, in herb. Paris Mus.

Collected in tropical America, Tahiti, Japan, Malacca, India, and northern Africa.

RAMALINA SUBFRAXINEA Nyl. Bull. Soc. Linn. Norm. II. **4**: 139. 1870

Gaudichaud, in herb. Paris Mus.

Collected also in Chile, the islands of Juan Fernandez, and Mauritius.

PHYSCIA (Schreber) Wainio

PHYSCIA AIPOLIA (Ach.) Nyl. Flora **1870**: 38. 1870

Parmelia aipolia Ach. Syn. Lich. 215. 1814.

Physcia stellaris (Linn.) Fr. var. *aipolia* Nyl. Notis. Sällsk. Fauna Flora Fenn. **5**: 111. 1861.

Gaudichaud, in herb. Paris Mus.

Collected in Europe; the American and Asiatic tropics.

PHYSCIA CRISPA (Ach.) Nyl. Syn. Lich. **1**^{2}: 423. 1860

Parmelia crispa Ach. Syn. Lich. 312. 1814.

Physcia domingensis Nyl. Enum. Lich. 106. 1857.

Gaudichaud, in herb. Paris Mus.

A purely tropical species so far as known and collected only in the American tropics and the islands of the Pacific.

ANAPTYCHIA Koerber

ANAPTYCHIA DENDRITIC (Pers.) Wainio, Lich. Brésil 134. 1890

Borrera dendritica Pers. in Gaud. Bot. Freyc. Voy. Uranie 207. 1826–30.

Gaudichaud, in herb. Paris Mus.

This species as yet has only been reported from Brazil and the Marianne Islands.

RHIPIDONEMA Mattirolo

RHIPIDONEMA MEMBRANACEUM (Arg.) Sacc. Syll. Fung. **6**: 688. 1888

Dictyonema membranaceum Arg. Syst. Alg. 85. 1824.

Gaudichaud, in herb. Paris Mus.

Described from material collected in the Marianne Islands by Gaudichaud and placed under the Confervoideae. The species, however, belongs to the small group of the Hymenolichens which seem to be confined to a tropical habitat.

Found in the tropics of both the old and new world.

DOUBTFUL SPECIES

The following questionable species have been excluded from the list above. They are from Persoon's enumeration of Gaudi-

chaud's collection, twelve being types of new species. Further study will be necessary to establish their identity if that be possible.

Ctesium album Pers.
Ctesium rugosum Pers.
Gyrophora perforata Pers.
Collema ulvaceum Pers.
Collema peltigera Pers.
Collema stellare Pers.
Physcia fastigiata Pers.
Lycogala marianna Pers.
Sphaeria laguncula Pers.
Himantia nodulosa Pers.
Porinia tessellata Pers.
Ophegrapha cymbiformis Floerke
Ophegrapha cincta Pers.

NEW YORK BOTANICAL GARDEN.

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NOTES RELATING TO THE GYMNOSPORANGIA ON MYRICA AND COMPTONIA

B. O. Dodge and J. F. Adams

(With Plates 2 and 3, Containing 9 Figures)

The only species of rust on the sweet fern heretofore reported is the *Cronartium* that has its *Peridermium* stage on the pines (Clinton, 1908; Orton & Adams, 1914). This rust was described by Arthur (1906) from material collected at Egg Harbor, New Jersey. It was quite abundant at Toms River, New Jersey, in September, 1915, where it was found by members of the party on the excursion conducted by the Torrey Botanical Club during the Twentieth Anniversary Celebration of the New York Botanical Garden.

During the spring and summer months of 1916, the writers, Professor Harper, and others made several trips into the pine barrens of New Jersey to gather data bearing on the life-histories of the species of *Peridermium* and *Gymnosporangium* to be found in this region. On June 14 we found that certain plants of *Comptonia* bearing *Cronartium Comptoniae* were also infected with some other rust whose spermogonial stage was just becoming evident. As no aecidium had been reported on this host, it was decided to make another visit to this spot a few weeks later to obtain mature specimens.

On July 4 we found a number of leaves and young shoots bearing ripe aecidia, and spores were being shed quite abundantly. The only leaves found to be infected June 14 were very young, some of them scarcely unfolded from the bud. The hypertrophy induced by the rust is not definitely limited, but is general and extends along either side of the midrib beneath, making the leaf quite thick and brittle.

As only a slight yellowish discoloration accompanies the infection, this stage of the rust is easily overlooked. We also found spermogonia on pistillate catkins, which were of a darker orange color. We were unable to find aecidia on these burs later.

The aecidia on the leaves and young stems appear to be scattered rather sparingly over the long hypertrophied or thickened portions. A marked transformation of the leaf seems to accompany infection. Every leaf that we found bearing aecidia had made a coil of one or two turns like a ram's horn, which, in a way, quite effectually conceals the rust from view. *Roestelia transformans* was originally described as causing considerable deformation of the *Aronia* leaves, yet a great many leaves infected are in no way misshapen. Further collections of this rust on *Comptonia* may prove that it does not always cause the leaf to roll up. The peridia are whitish, with very brittle segments which soon disappear, or break off and become scattered over the under surface of the leaf. The spores are globoid, varying in size from 25–35 μ. They appear to be rather dark-orange or salmon-colored in mass. The spore wall is finely warted or echinulate. This rust resembles *Aecidium myricatum,* known so far to occur only on the bayberries. *Cronartium Comptoniae* has been found also on species of *Myrica,* and it is not surprising to find that a *Gymnosporangium* capable of infecting *Myrica* could also infect *Comptonia* as the two genera are closely related.

Fromme (1914) has shown that *Aecidium myricatum* is connected with *Gymnosporangium Ellisii* on *Chamaecyparis.* In 1914 Dodge (1915) tried to infect *Comptonia* with *G. Ellisii* without success. The trial host plants lived only about two weeks after the inoculations were made, but as the rust appeared on the *Myrica* within a week it was presumed that this *Gymnosporangium* would not infect the sweet fern. The teleutospore material used at the time was in the best of condition, so that failure was not on this account. We made some attempts to infect the sweet fern with the spores of *G. Ellisii* under controlled conditions in the greenhouse, but the season was so far advanced that the sweet fern could not be made to survive transplanting, and the spores of *G. Ellisii* were past their prime.

Aecidium myricatum on the bayberry is especially abundant at Toms River; in places the rust appears to be destructive, especially where it attacks the branches or main stems. The southern white cedar and sweet fern grow together in many localities along the coast, but we have found the sweet fern rust only at this one

place, which is just across the bridge near "the bird-house establishment" at Toms River. Even here it is rare. If the rusts on the bayberry and sweet fern belong to the same species, it is interesting to note that the host reactions are somewhat different in the two cases.

The aecidia on the *Myrica* are ordinarily very closely crowded on rather definitely limited thickened areas (Pl. 2, f. 1–3). Infected sweet fern leaves are shown in Pl. 3, f. 1–4. The coiling of the leaves resembles somewhat the effect of insect work, especially such as one sees on sweet fern plants. The aecidiospores from the two hosts appear to be identical so far as size and wall characters are concerned. It is possible that they are darker colored in the rust on *Comptonia*. Our photographs (Pl. 2, f. 3, 4) show that the peridial segments may be more persistent and more recurved in the *Myrica* rust. This may have been due to the difference in the atmospheric conditions prevailing at the times the photographs were taken. Fromme (l. c.) found that spores of *Aecidium myricatum* had seven or eight germ pores. Professor C. R. Orton has kindly examined our specimens of the rust on *Comptonia* and *Myrica* and finds that the peridial cells and aecidiospores are the same in both forms, although the number of germ pores in the spores of the rust on the sweet fern was not determined.

We have made a number of inoculation experiments with *Aecidium myricatum* from *Myrica* with the view to determine the conditions under which the *Chamaecyparis* may become infected. Eleven potted cedars were sprayed with aecidiospores on June 21, 1915, and kept in a moist chamber two days. The plants were then stacked in the greenhouse under bayberry plants heavily infected with the rust. The cedars were sprayed twice each day during the time spores were being shed from the rusted bayberry plants. As yet there are no indications of infection. Reed and Crabill (1915) have raised the question in connection with the infection of red cedars by the apple rust whether it may not be that the aecidiospores winter over and infect the cedars in the spring. Just why this is assumed or thought possible is not clear in face of the fact that they show in tables of germination experiments that spores germinate in cultures to the extent of 12 per cent. in some cases during July.

We have shown that the percentage of germinating spores in our cultures of *Aecidium myricatum* is very low, yet one can find germinating spores in the drops of water on the leaves of cedars that have been sprayed and kept in the infection chamber twenty-four hours. The results of a number of test experiments are given in Table I. Tap water was used in all cases.

Table I. Shows the approximate percentages of germination of aecidiospores of *Gymnosporangium myricatum* in water cultures.

Date	Method	No. Tests	No. Positive Results	Approximate Percentage of Germination
May 22, 1915	Hanging drop	19	0	0
" 28, "	Petri dish	5	0	0
June 2, "	" "	12	0	0
Mar. 10, 1916	" "	6	0	0
June 10, "	Watch glass	2	1	.4%
" 11, "	" "	6	6	.3%
" 16, "	Petri dish	3	3	.5%
" 16, "	Watch glass	6	5	.2%
" 20, "	Hanging drop	6	0	0
" 20, "	Watch glass	6	6	.5%
" 20, "	Petri dish	3	3	1.0%
" 25, "	Watch glass	3	3	.5%

Where spores are floated on water in watch glasses or Petri dishes a low percentage of germination was obtained. In several cases in which watch glass tests of aecidiospores of both *G. myricatum* and *G. clavariaeforme* were made, the glasses were stacked on one another, and it was found that the spores in the uncovered dish germinated sooner and usually with a higher percentage. The Petri dishes were always set in the damp chamber, and without cover, so that there was an unlimited supply of air. Under these favorable conditions the spores begin to germinate within six or eight hours. Leaves bearing aecidia had been placed in cheesecloth bags and hung outside the greenhouse all winter; spores from these leaves did not germinate in Petri dish cultures when tried the following March, as shown in the above table.

In June, 1916, germination tests were made of aecidiospores of several other species of *Gymnosporangium*. There is the greatest variation in the behavior of the different species. *G. globosum* showed the lowest percentage, not over 0.1 per cent.; *G. juvenescens* up to 10 per cent.; *G. nidus-avis* occasionally as high as 50

per cent.; *G. clavariaeforme* invariably gave 95–100 per cent. germination if the watch glasses were left uncovered in the damp chamber.

The salmon color of the spores of *Aecidium myricatum* is due, as in many other spore forms, to the color of the spore contents.

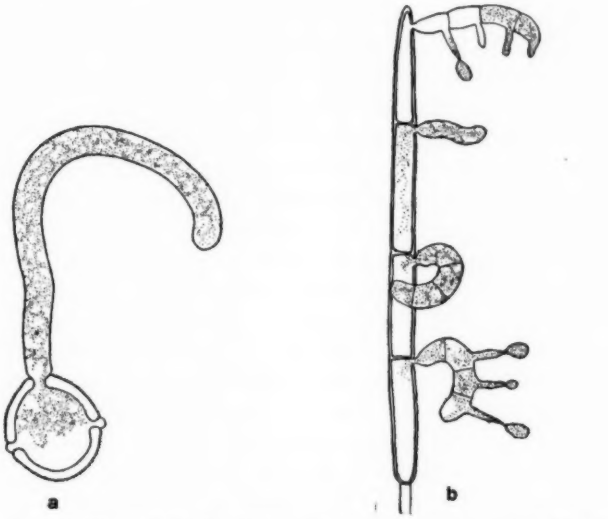

FIG. 1. *a*. Aecidiospore of *Gymnosporangium myricatum* twenty-two hours after the beginning of the germination test experiment. Three germ pores appear in one plane. Most of the orange-colored contents have moved out into the germ tube. × 450. *b*. A germinating teleutospore of *Gymnosporangium myricatum*. × 450.

The germ tube emerges from the germ pore and immediately enlarges considerably (Text-fig. 1, a); it sometimes branches rather irregularly. The wall of the spore is only slightly thickened about the germ pores. The brown color of the spores of the other species of *Gymnosporangium* mentioned above is in the spore wall, and there is, for example, in *G. clavariaeforme* a very prominent thickening of the wall about the spores. Sorauer's figure 50[9] (1906) of a germinating aecidiospore does not adequately bring out these features.

Reed and Crabill (1915) obtained much higher percentages of

germination of the aecidiospore of *G. macropus* than we have with *Aecidium myricatum,* yet they assume that the spores may winter over and germinate in the spring, since they were unable to obtain artificial infections of red cedars.

Harshberger (1902) has made a study of the behavior of the mycelium of *G. Ellisii* in the tissues of *Chamaecyparis.* He finds an abundance of intracellular hyphae in the cortex, soft bast, wood cambium and tracheids, as well as in the medullary rays, and believes that the mycelium residing in the wood cambium and soft bast is responsible for the increased thickening of the annular rings. Farlow (1880) has very adequately described this *Gymnosporangium* and figured very characteristically a small witches'-broom and a germinating teleutospore. Our figure 5 in plate 2 shows the sori in the dried conditions. We find that they do not swell up to such a great extent when moistened as do sori of most Gymnosporangia. The promycelia are usually quite sharply bent, as appears in Text-figure 1, b.

The perfection of methods by which seedling cedars may be easily infected should afford a better opportunity for studying the behavior of both the host and the fungus in their mutual relationships. The evidence is suggestive that *G. myricatum* also go to the sweet fern, but in view of the very complex interrelations which have so far been found between the hosts of the species of *Gymnosporangium* and their roesteliae, a positive conclusion can only be reached by actually demonstrating the infection of the sweet fern by *G. Ellisii.*

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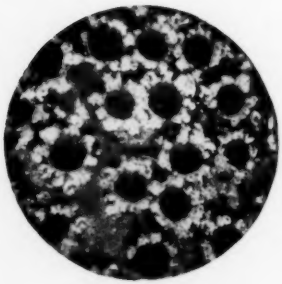

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GYMNOSPORANGIUM ELLISII — AECIDIUM MYRICATUM

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RUST ON COMPTONIA ASPLENIFOLIA

Orton, C. R., & Adams, J. F. Notes on *Peridermium* from Pennsylvania. Phytopathology 4: 23–26. *pl. 3.* 11 Mr 1914.

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EXPLANATION OF PLATES

PLATE 2. GYMNOSPORANGIUM ELLISII—AECIDIUM MYRICATUM

Fig. 1. Leaf of *Myrica carolinensis* infected at one point showing crowded aecidia. Natural size.

Fig. 2. Portion of the same leaf. × 2¼.

Fig. 3. A group of aecidia from an infected bud. × 5.

Fig. 4. A number of aecidia showing the white, recurved, peridial segments. × 20.

Fig. 5. A small witches'-broom on *Chamaecyparis* showing numerous teleutospore sori in the dry condition. About natural size.

PLATE 3. RUST ON COMPTONIA ASPLENIFOLIA

Fig. 1. Twig and bud infected; aecidia just beginning to show. Natural size.

Fig. 2. Infected leaf coiled up; aecidia scattered sparingly on under side and along the branch which is also infected for some distance.

Fig. 3. Another leaf showing that the lobes and midrib portion are much thickened. Peridial segments broken away and lying about on the leaf surface. × 2.

Fig. 4. Portion of the same branch shown in Fig. 2. The white spots show where aecidia are forming. × 2.

NOTES ON A FEW SPECIES OF ASHEVILLE FUNGI

H. C. Beardslee

(With Plate 4, Containing 3 Figures)

The last instalment of *North American Flora,* vol. 9, part 5, has greatly interested me. The number of species of our fleshy fungi which are considered is very great and the amount of work which has been done will doubtless be of much value to all students of the fungi. Some of the conclusions reached would seem to admit of some argument, but time and discussion will doubtless settle the doubtful points.

At present I am interested in some of the species considered as doubtful. A few of these have seemed to me to occur in my collecting grounds.

Among these doubtful species, the one which was most of a shock is *Mycena stylobates.* A very interesting *Mycena* occurs at Asheville, which is doubtless the one on which the reports of *Mycena stylobates* have been based. It is very distinct, and has so many of the characters attributed to Quélét's species that I have always referred it there. *Plate 4, f. 1,* which accompanies these notes, shows its characters fairly well. As I have found it, the pileus was 4–6 mm. broad, pale-gray in color, thin and membranous, campanulate, becoming expanded, striate to the disk, and bearing a few scattered hairs, which are plainly visible under a lens; gills free or nearly so, ventricose, distant; stipe 2–5 cm. long, filiform and fragile, glabrous, seated on a flat disk which is marked with distinct striations and fringed with a row of bristles; spores $6 \times 3\,\mu$. The peculiar and striking feature is the base of the stipe. I have seen no other species which resembles it in this particular. In the figure, this feature can be distinctly seen. It will be seen that our plant answers the description very well except that the color as it occurs here is pale-gray and not white. Stevenson says of it, however, "commonly wholly white, but

varying gray, becoming azure-blue." Judging from this, the color would hardly be an insuperable barrier.

Our plant is at all events a very striking and distinct species and we should have some name for it. Personally, I shall prefer to call it *Mycena stylobates,* but at any rate it is too distinct and interesting to be excluded from our flora.

Mycena Iris Berk. seems also to occur here. I find at Asheville specimens which do not seem to differ from specimens of Berkeley's species which were found in Sweden. The group of forms which are to be found at Asheville with blue mycelium at the base of the stipe is very perplexing, and I have found my views as to the number of species which can be recognized changing. I find, however, a form, often growing on the ground which has seemed to me *M. Iris.* It is fairly large, 12–16 mm. and has the margin of the pileus clothed with curious blue fibrils, which are closely glued down to the surface of the pileus and give it a very distinct appearance. These fibrils seem to be largely lacking in the smaller forms which are found growing on logs, but are quite plain in the European plant. Whether we have more than one species in this group has seemed uncertain to me. In this connection it may be noted that Bresadola, early in Fungi Tridentini describes *Mycena calorhiza* with blue mycelium, but later on decides it to be a form of *Mycena Iris.* Evidently the same perplexing forms with blue mycelium occur in Europe.

Omphalia strombodes Berk. & Mont. is another species which seems to need attention. As it is described, it has the spores "subglobose 4–5 μ long." An European species has been described and figured by Bresadola as *Clitocybe xanthophylla,* afterward transferred to *Omphalia.* This agrees well with our plant in form, but is, as Bresadola writes me, distinct from the species described by Morgan in its spores. These he describes as subovate and pointed at one end, 7–8 $\times$ 4–5 μ. This would seem in these days ample difference for specific distinction.

The difficulty which I find in regard to the plant that occurs in North Carolina is that it agrees rather with Bresadola's description than with Morgan's. I have this summer examined about

a dozen collections, by setting the pilei on slides and measuring the abundant spores which were deposited. The prevailing form is exactly as Bresadola describes it in his plant, except that I find the spores a little larger than his limit. They are frequently 9μ long, but are always ovate and pointed in the typical spores. There would seem, therefore, to be no valid reason, if the species are only distinguished by the spores, to consider our species distinct from *Omphalia xanthophylla*. The question is, however, whether we have two species in the United States or one. I have had no opportunity to examine fresh material from Ohio to ascertain whether the Ohio plant that Morgan found is different from the North Carolina plant. The fact that a small per cent. of spores are to be found in every deposit which are shorter and which could be reconciled with Morgan's measurements, makes me doubtful in regard to the distinction of the species. At all events, our plant would seem to be certainly Bresadola's species, and either the spore measurements given for *O. strombodes* should be modified or Bresadola's species should be added to our list of Omphalias.

Omphalia integrella (Pers.) Quél. appears almost every summer at Asheville. It is too small for a good photograph, but is so distinct that its identification is not difficult. As it occurs here, its distinguishing marks are the narrow and rather thick gills. I know of no other species which resembles it at all closely. I have felt very certain of its identity.

Omphalia gracillima Weinm. appears occasionally. In size and appearance it resembles Peck's *Marasmius albiceps*. It is, however, amply distinct from it. I find it pure-white, with a delicate, white stipe and the spores $6 \times 3 \mu$. Bresadola has seen and approved my specimens. *Pl. 4, f. 2,* shows its appearance as well as can be expected in so minute a plant.

Omphalia cuspidata Quél. I have found a few times. *Pl. 4, f. 3,* shows its appearance well. It is pure-white and very small. Both the pileus and stipe are thicker than would be expected in so minute a species and the pileus has a strong umbo. The gills are narrow, distant, and usually forking. It is found in wet places on old leaves, and can easily be overlooked on account of

V91
JAN
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1. MYCENA STYLOBATES
2. OMPHALIA GRACILLIMA
3. OMPHALIA CUSPIDATA

its small size. My material and photograph were submitted to Bresadola and the determination approved by him. He said of it: "Identical in form and notes with *O. cuspidata* Quél. To me your plant is absolutely this species."

A number of other species seem worth discussing but this instalment will probably be sufficient at this time.

ASHEVILLE SCHOOL,
ASHEVILLE, NORTH CAROLINA.

EXPLANATION OF PLATE 4

Fig. 1. *Mycena stylobates.*
Fig. 2. *Omphalia gracillima.*
Fig. 3. *Omphalia cuspidata.*

SOME FUNGI COLLECTED IN VIRGINIA

WILLIAM A. MURRILL

During a brief vacation near the end of October, 1916, the writer spent several days on Apple Orchard Mountain in the Blue Ridge, eighteen miles north of Bedford, Virginia, and obtained a number of fungi for the Garden herbarium. Large collections of fungi had previously been obtained by me from the regions about Blacksburg and Mountain Lake, in the southwestern part of Virginia and from Falls Church, near Washington, but my knowledge of Blue Ridge fungi had been chiefly gained at Biltmore and the Pink Beds in western North Carolina.

October proved to be much too late for most of the fleshy species. The weather was no colder than in New York, but the season was earlier and most of these species had disappeared. *Hypholoma perplexum,* a late autumnal species, was the only one found in sufficient quantity to be used as food. *Laetiporus speciosus* had been common on oak and chestnut logs, but the sporophores were fast decaying. *Rostkovites granulatus* and *Russula rubrotincta?* were abundant in a pine grove south of Bedford at 1200 feet elevation, but were not seen in the mountains. This species of *Russula* was especially well-flavored, and entirely free from insects on account of the cool weather. *Trametes robiniophila,* a tough polypore, was common on black locust around Bedford, but did not occur in the mountains. It is a southern species.

Apple Orchard Mountain is 4200 feet high, about 200 feet higher than the famous twin Peaks of Otter, which are conspicuous a few miles to the west. There is a camp near the summit, where one may be very comfortable, and good mountain trails radiate from it in all directions. A large swamp near the camp is filled with *Rhododendron catawbiense* and *Kalmia latifolia* intermixed with old hemlocks, and many interesting fungi doubtless occur there in July and August. The chief forest trees are chestnut and species of oak, red oak predominating. The

chestnut canker has appeared in the valleys to the north and south of the mountain, but has not yet extended above them.

The summit of the mountain consists of masses of granite rock, with some grass, a few stunted red oaks, the Alleghany birch, and thickets of hawthorn, willow, dogwood, gooseberry, and hazelnut. The north side of the mountain, especially near the waterfall and brook, is quite moist and should yield a large number of fungi at the proper season.

In the following list of fungi, which is alphabetical, the numerals 1–3 denote a definite number of times collected, while the letters *n, nn,* and *nnn* mean "frequent," "common," and "very common," respectively.

LIST OF SPECIES COLLECTED

Armillaria putrida[2]
Bjerkandera Spraguei[1]
Bovista pila[n]. In open field.
Calostoma lutescens[n]. Abundant by roadsides in rhododendron thicket. Dr. Plukenet described this as "Fungus pulverulentus, virginianus, caudice corallino, topiario arte contorto."
Clitocybe sp.[1] In open grassy field. Neither *C. dealbata* nor *C. aperta.*
Claudopus nidulans[1]
Coltricia cinnamomea[1]. In sandy soil.
Coriolus nigromarginatus[n]
Coriolus prolificans[nnn]
Coriolus versicolor[nn]
Corticium polyporoideum[1]. On oak bark. Determined by Professor E. A. Burt.
Crucibulum vulgare[1]
Daedalea confragosa[n]
Daedalea quercina[n]
Daldinia concentrica[n]
Elfvingia megaloma[n]
Exobasidium Vaccinii[1]
Flammula sp.[1] On a dead oak log.
Flammula sp.[1] On a dead stump of *Kalmia latifolia.*
Fulvifomes Robiniae[n]
Gymnopus dryophilus[1]. On a deciduous stump.
Gymnosporangium sp.[1] On fruits of *Crataegus neofluvialis.*
Gyrophora Muhlenbergii[nn]. On rocks along summit of mountain. "Black Rock" owes its name to this lichen.
Hapalopilus gilvus[n]
Hemiarcyria rubiformis[1]. Abundant on a dead trunk. This is a beautiful little slime-mold.
Hexagona alveolaris[1]

Hydnoporia fuscescens[1]
Hydnum sp.[1] On leaf-mold in woods.
Hydnum adustum[2]
Hydnum caput-ursi[1]. On a standing oak trunk on summit.
Hypholoma perplexum[nn]
Inonotus radiatus[1]. On dead *Betula alleghanensis* on the summit.
Ischnoderma fuliginosum[1]. On hemlock.
Laccaria laccata[n]
Lachnocladium sp.[1]
Laetiporus speciosus[nn]
Lentinus strigosus[1]
Lenzites betulina[1]
Lycogala epidendrum[1]. A common slime-mold, not properly included among the fungi.
Lycoperdon gemmatum[1]. In sheltered woods.
Monadelphus illudens[1]
Panellus ursinus[1]
Plowrightia morbosa[1]. On *Prunus serotina.*
Poria sp.[1] Yellow.
Poria sp.[1] With hymenium somewhat resembling that of *Coriolus biformis.*
Poria medullapanis[1]. On black locust.
Prunulus galericulatus[n]
Pyropolyporus igniarius[1]. On birch.
Schizophyllus alneus[n]
Scleroderma aurantiacum[1]
Scleroderma Geaster[1]. On a sheltered southern slope.
Spongipellis fragilis[1]. Abundant on a decayed hemlock log. I had collected this rare species at Ohio Pyle, Pa., and Lake Placid, N. Y., but not in Virginia. See "Southern Polypores," p. 61.
Stereum candidum[n]. On living white oak trunks, apparently confined to the bark.
Stereum complicatum[2]
Stereum lobatum[nn]
Stereum rugosum[1]. On a birch trunk.
Tremella lutescens[1]. On a hemlock log.
Tyromyces chioneus[3]

NEW YORK BOTANICAL GARDEN

NOTES AND BRIEF ARTICLES

Dr. V. H. Young, formerly of the Botanical Department of the University of Wisconsin, has been appointed professor of botany in the State University of Iowa, in charge of mycology and plant physiology.

Dr. Alban Stewart, instructor in botany at the University of Wisconsin, has been appointed professor of botany and bacteriology in the Florida State College for Women at Tallahassee, Florida.

Dr. J. C. Arthur and Professor H. S. Jackson, of Lafayette, Indiana, have been granted research scholarships for the month of January. They will continue work on the plant rusts for *North American Flora.*

Newton B. Pierce, formerly plant pathologist for the U. S. government for the Pacific coast region, died at his home in California on October 13, aged sixty years.

Professor J. C. Arthur recently received the degree of Doctor of Laws from the University of Iowa. In conferring the degree, Professor Macbride placed special emphasis on Professor Arthur's contributions to agriculture and horticulture in the study of plant diseases; his work in physiological botany; and his fundamental studies in mycology, especially in the plant rusts. Professor Arthur has the distinction of being the first botanist appointed to an American experiment station.

Helicostylum and *Cunninghamella,* two genera of the Mucorales new to America, were reported from Michigan by A. H. W. Povah in the seventeenth annual report of the Michigan Academy of Science.

"The Comparative Histology of Certain Californian Boletaceae," by Dr. H. S. Yates, is a recent publication of decided merit from the department of botany of the University of California. There is opportunity for this harmonious blending of morphology and taxonomy in most groups of fungi.

The report of the Selby Smelter Commission recently issued as Bulletin 98 of the Bureau of Mines at Washington contains valuable information regarding the effect of smelter gases on various forms of vegetation, including fungi. The last twenty pages of the report are devoted to a bibliography on the injurious effects of sulfur dioxid.

The list of unreported Michigan fungi for 1911–1914, by C. H. Kauffman, covers about twenty pages in the seventeenth annual report of the Michigan Academy of Science, half of which are devoted to rusts. The example set and so patiently followed by Dr. Kauffman is highly commendable and worthy of imitation by mycologists in every state.

The great quantity of *Coprinus comatus* which often springs up in newly made streets and roads suggests that some method might be devised for cultivating this attractive and well-flavored edible species; which could not be shipped nor exposed long in the market, but would be valuable if grown in one's garden. This is an experimental problem suitable for almost any careful and patient student.

A recent bulletin by John R. Johnston on the present status of the cocoanut budrot disease states that the export of cocoanuts from Baracoa, Cuba, in 1898 was 24,000,000 nuts and in 1915 only 4,000,000. In Jamaica, a law was passed in 1911 to prevent the spread of infectious diseases, with the result that the budrot disease has caused little damage there since. The disease has not yet reached Florida, the Bahamas, Porto Rico, Panama or Mexico.

Dr. S. M. Stocker, of Duluth, Minnesota, recently sent in specimens of *Lentinus strigosus,* which in the fresh state had an odor

resembling that of slippery elm. Dr. Stocker not only tested the specimens himself, but submitted them to two drugs clerks independently and both of them promptly agreed with him. Dr. Stocker calls attention to the fact that Massee says that the odor of this species is spicy and W. Smith states that it smells pleasantly of anise.

Romell, in a recent number of the *Svensk Botanisk Tidskrift*, explains the brown powder occurring on the upper surface of hymenophores of *Ganoderma lucidum* and *Elfvingia applanata* as true spores from the basidia wafted upward by currents of air and allowed to settle on the hymenophores and nearby objects, where they adhere by means of their gelatinous coats. This would upset the conidia theory. The air currents are explained by Romell as follows:

"It is perhaps not unreasonable to suppose that from the ground heated during a hot day arise during a following cold and calm night upwardly directed air currents, which though very feeble and perhaps not perceptible to our senses, yet are strong enough to force the falling spores upwards, so that these are caused to hover in the air above their native place a more or less long while ere they are allowed to fall again and land on the upper side of objects lying in their way."

A splendid specimen of *Inonotus dryophilus* was obtained on December 4, 1916, from the trunk of a living white oak which stands in the Hemlock Forest near the Waterfall. It grew about 25 feet from the base of the tree and emerged from a small knot-hole. In the autumn of 1908, a smaller, more resupinate specimen was taken from near the base of the same tree and reproduced in color in *Mycologia* for May, 1909. During the intervening years, a few very small hymenophores have appeared at various times at different knot-holes on the trunk, but so far as known the tree has never produced a specimen of such proportions as the one just collected. The trunk of the tree must be badly decayed by this time, and many of the lower branches have disappeared.

A new disease of *Paulownia tomentosa,* caused by *Valsa Paulowniae,* is described by Takewo Hemmi in a recent number of *The Botanical Magazine* of Tokio, Japan. This disease attacks the branches and trunks of *Paulownia tomentosa* without regard to its age, but the young trees three or four years old are most liable to attack. In the case of a young tree, the disease appears first at the tip of the clear trunk in the early spring. The bark of the affected part turns brown in color, as if killed by freezing. The discolored portion gradually increases its area, extending downward toward the thicker portion of the stem. From May to June, the disease progresses most rapidly, and in consequence the tree is killed, with an appearance of "die-back." The fungus enters the tree through a wound having a layer of dead cells on its exposed surface, in which a mass of mycelium is first formed. In the vicinity of Sapporo, the winter injury due to the very low temperature is the most common and powerful agency in inducing the spread of this disease.

NEW COMBINATIONS

Most of the new species published in *North American Flora,* volume 9, part 6, belong to the genus *Clitocybe,* which is commonly accepted by mycologists. For others, the following new combinations are here proposed:

HYDROCYBE CALIFORNICA = **Hygrophorus californicus**
CAMAROPHYLLUS ANGUSTIFOLIUS = **Hygrophorus angustifolius**
CAMAROPHYLLUS AURATOCEPHALUS = **Hygrophorus auratocephalus**

The only species published in *Mycologia* last year that need be recombined is the following, described on p. 113:

MELANOLEUCA OLIVACEIFLAVA = **Tricholoma olivaceiflavum**

Species published in *Mycologia* for 1915, on pp. 44 and 222, may be recombined as follows:

ROSTKOVITES CACLIFORNICUS = **Boletus californicus**
GYMNOPILUS FARINACEUS = **Flammula farinacea**

W. A. MURRILL.

TWO NEW SPECIES OF FLESHY FUNGI

Gymnopus Ellisii Murrill, sp. nov.

Pileus minute, convex, becoming depressed, gregarious, 2 mm. broad; surface milk-white, dry, minutely pubescent, margin at

first incurved; lamellae adnate, becoming slightly decurrent, narrow, not crowded, white; stipe slender, hollow, pulverulent, white, pubescent at the apex, mycelioid at the base, 1–1.5 cm. long, less than 1 mm. thick.

Type collected on leaves and twigs of white cedar in a swamp at Newfield, New Jersey, October, 1875, *J. B. Ellis* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the type locality.

Omphalopsis pallida Murrill, sp. nov.

Pileus conic to convex, becoming umbilicate, gregarious, 1.5 cm. broad; surface dry, smooth, minutely silky, not striate, pallid, pale-avellaneous on the disk; lamellae decurrent, especially when young, arcuate, distant, broad, white; spores ellipsoid, smooth, hyaline, 7–8.5 × 4–5 μ; stipe very slender, cartilaginous, equal, smooth, hyaline, white, 2–3 cm. long, 1 mm. thick.

Type collected in soil on a roadside bank at Lake Placid, Adirondack Mountains, New York, October 3–14, 1912, *W. A. & Edna L. Murrill 1093* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the type locality.

For the benefit of those using Saccardo's nomenclature, the following new combinations are proposed:

GYMNOPUS ELLISII = **Collybia Ellisii**
OMPHALOPSIS PALLIDA = **Omphalia pallida**

W. A. MURRILL.

AN EPIDEMIC OF RUST ON MINT

During the summer of 1915, an epidemic of rust (*Puccinia Menthae* Pers.) developed in gardens at Hanover, New Hampshire. The disease was first discovered about the middle of June, or about two weeks after the beginning of a long period of heavy and almost continuous rainfall. The chocolate-brown sori broke out on the leaves of the mint and increased with such rapidity that by the early part of August the plants were rendered unfit for table use.

Since this is the first attack of the disease in this locality, at least so far as the writer can determine, and since the rainfall was far above that of a normal season, it became a matter of interest

to determine whether or not the rust would reappear. For this reason the infected growth was left undisturbed in the fall, and no attempt was made to control the disease.

Throughout the present summer the mint beds have been carefully watched but no trace of the rust has been found at any time.

These observations, though somewhat superficial, would seem to indicate that this rust, which is capable of destroying the foliage of the mint plant during a wet season, may become entirely inactive with the return of a normal season.

A. H. CHIVERS.

SOME PAPERS PRESENTED DURING CONVOCATION WEEK

At a joint session of the Botanical Society and the Phytopathological Society held Friday afternoon, December 28, in connection with the American Association for the Advancement of Science, a number of papers were delivered which were of interest to mycologists.

The first paper of the afternoon was presented by Dr. J. C. Arthur, of Purdue University. After briefly outlining the results of his work on the rust cultures for the season, he gave a very interesting retrospect of his work on rust cultures beginning in 1899. Previous to this time, it had been pretty generally agreed that each rust had a definite life cycle consisting of several stages often borne on different host plants, but the life histories of few species were well known.

About this time a visit was made to Charles B. Plowright of England and his methods of culturing rusts studied carefully. These methods were very simple and consisted in sprinkling a barberry bush with water from an ordinary sprinkling can. The teliospores were then removed from some grass and placed on the leaves of the barberry. The plant was again sprinkled and placed under a belljar, where it was allowed to remain for several days. The belljar was then removed and in due time the rust infection appeared.

On returning to America these methods were employed with some modifications in working out the life histories of various species of rusts. The work has been continued up to the present time and the results published at intervals in various scientific

journals. Some time was also spent in outlining the changes in our ideas of what constitutes a species in the rusts. The differences of opinion regarding physiological and morphological species were considered.

Following this paper, I. E. Melhus called attention to his observations on the development of aecia on red clover in the greenhouse. Although several other clovers grew in close proximity, they remained entirely free from infection. Attempts to inoculate other clovers with the aecia from red clover were unsuccessful.

In the absence of G. R. Bisby, Dr. Arthur outlined briefly the contents of his paper, dealing with the rusts on the Onagraceae. Several species have formerly been recognized which have slight morphological variations. These apparent differences, however, become less conspicuous as the number of specimens increase. Mr. Bisby has concluded that these supposed species represent one very variable species in which several races or strains can be separated with very slight morphological variations.

A paper by W. H. Davis and A. G. Johnson on the aecial stage of the red clover rust was presented by Mr. Johnson. Examination of red clover from a number of fields showed aecia to be present in all except one. A request was then sent out for red clover plants from various localities. Over half of them showed aecia. Teliospores were used to make sowings and from these aecia were again obtained, showing the rust to be autoecious.

In the absence of E. B. Mains, Dr. Arthur also outlined his paper. Until recently, no species of *Melampsora* has been known in the Western Hemisphere on *Euphorbia*. In one year three such species have been reported, occurring from Maine to Wyoming. One of these was doubtless imported, while the one occurring in Indiana was probably native but identical with a European species. This sudden occurrence of a class of rusts formerly unknown in America in such widely separated localities is regarded as rather a remarkable phenomenon.

Dr. Arthur, in the absence of Mr. Bisby, also mentioned his paper on the short-cycled species of *Uromyces* in North America. Also, in the absence of C. A. Ludwig and C. C. Rees, the same speaker made a brief mention of their work on the structure of the uredinium in *Pucciniastrum Agrimoniae*.

The next paper was by John A. Elliott on a new parasitic slime-mold suitable for class work. This slime-mold causes a very serious disease of sweet potatoes. There are two methods of infection, one by means of swarm spores and one by means of the plasmodium. Spots are caused by the plasmodium entering the young rootlets. The plasmodium finally migrates from the wounds, leaving pits. The paper was well illustrated by lantern slides. Considerable discussion followed.

Dr. Arthur again covered the main points in Mr. Rees's paper on the *Fritillaria* rusts of Europe and America. From his studies it was concluded that there were two species of rusts on *Lillium* and *Fritillaria* hosts and that the American species were different from the European.

R. H. Colley spoke of the difficulty of diagnosing the white-pine blister disease before the spores are developed. It has been found by him that the pycnial scars are very characteristic and with experience can be used in detecting the presence of the disease. A number of slides were shown, illustrating the pycnial scars and also the rusty color of the mature spores.

The Uredinales of the West Indies were next treated by Dr. Arthur. This study was taken up a year ago in connection with extensive collections of F. L. Stevens, who for some time past has been making a study of the parasitic fungi of Porto Rico. In addition to these, Drs. Olive and Whetzel collected a number of species not previously known. Other collectors have added to the list, including Mr. Percy Wilson and other collectors from the New York Botanical Garden. The total number of species known from the West Indies is 214. It has been found that, so far as the rust flora is concerned, the Cuban flora resembles that of North America while the Porto Rican flora resembles that of South America. One noteworthy fact in connection with the West Indian rusts is the large number of short-cycled species. It has been preciously supposed that short-cycled rusts were an adaptation to a short growing season. Under tropical conditions, twenty-five per cent. of the species are found to be short-cycled, a fact which is directly contrary to previously accepted theories.

Dr. Trelease presented the paper on the parasites of *Meliola* in Porto Rico which was to have been read by Dr. F. L. Stevens.

A number of fungi associated with *Meliola* which were previously supposed to represent a stage in the development of the *Meliola* are now known to be parasites. A list of about thirty such species has been prepared for publication, belonging mainly to the ascomycetes and imperfects.

G. W. Keitt next read a paper on the leaf spot of cherries. Cherries are cultivated extensively in the region studied and the leaf spot has been very destructive. The paper was limited mainly to the methods of controlling the disease. Control has been accomplished along two lines: (1) sanitation and (2) spraying. Both together have been found to be very effective. Several different kinds of sprays have been employed. The effectiveness of the control was well illustrated by means of lantern slides.

W. C. Coker spoke on the genus *Amanita* in the South. The material on which this paper was based was collected in the same general region in which Curtis and Ravenel collected many years ago. According to Coker, there is no good reason for separating the two genera *Amanita* and *Amanitopsis*. Specimens found growing in large numbers in close proximity showed the presence of the veil to be very inconstant. In many cases, it simply failed to develop. Interesting discussion followed the reading of this paper.

The next paper was by J. Rosenbaum on strains of *Rhizoctonia*. Two strains of this fungus have been isolated from the stems of potatoes, which can be distinguished pathologically, physiologically, and morphologically. It is possible that the presence of different strains may account for the conflicting reports regarding artificial infection by the fungus.

C. W. Edgerton spoke briefly of disease resistance to certain fungi in tomatoes. There is a great deal of difference in the susceptibility of plants grown in the same field. Selection and crossing of plants have shown good results in the production of immunity to the disease. Discussion followed the reading of the paper.

R. H. Colley gave a very interesting paper on the mycelium of the white-pine blister rust, calling attention to the way in which the haustoria penetrate practically every cell in the infected region of the host, often causing the nucleus to be pushed in on one

side. The paper was well illustrated by lantern slides showing the microscopic details.

Owing to the lateness of the hour, the writer failed to hear the reading of the last two or three papers. The meeting was well attended and considerable interest was manifested in the subjects under discussion.

At the Saturday morning session of the Phytopathologists, in addition to the strictly pathological papers, several papers were offered which were of interest mycologically.

One paper which deserves special mention was that by L. H. Pennington on Boleti and mycorrhiza upon forest trees with special reference to those of white oak. It was suggested that some of the mycorrhiza might be strictly parasites rather than mutualistically associated with the host. Attention was also called to the observation of certain sclerotia which appeared to belong to the Boleti and it was thought that possibly the Boleti wintered over in this form. In the discussion that followed, Professor R. A. Harper mentioned the finding of numerous sclerotia in Wisconsin in oak clearings.

F. D. Fromme called attention to root rot of apples caused by species of *Xylaria*. While this fact has been frequently observed, it is almost new to literature. The symptoms and amount of loss were considered and illustrated by a number of lantern slides.

Dr. Arthur read parts of a paper on a key to the aecia of the *Carex* rusts prepared by F. D. Kern which would enable the botanist to identify these rusts by the aecial stage. It was referred to as a clever scheme and the first key of its kind ever undertaken.

E. W. Olive called attention to a rare rust from Porto Rico. This has been classed as an insect gall by local botanists and in fact somewhat resembles one. While it shows certain rust characters, its position with this group is a little uncertain. In the discussion that followed, Professor R. A. Harper suggested that it might be an intermediate form between the smuts and the rusts.

FRED J. SEAVER.

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